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*Stream Buffer Restoration
and
Shoreline Stabilization
Information Guide*



The following organizations participated in creating this guide:

Alliance for the Chesapeake Bay

Center for Chesapeake Communities

Maryland Department of Natural Resources

Anne Arundel Soil Conservation District

Calvert Soil Conservation District

Charles Soil Conservation District

Howard Soil Conservation District

Montgomery Soil Conservation District

The Patuxent Reservoir Watershed Protection Group

Prince George's Soil Conservation District

St. Mary's Soil Conservation District

Washington Suburban Sanitary Commission

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INTRODUCTION

The Patuxent River Watershed contains approximately 590,000 acres in Maryland, in the suburban Washington/Baltimore corridor with Montgomery, Howard, Anne Arundel, Prince George's, Charles, Calvert, and St. Mary's counties.

Each year, erosion and destabilization of the riverbanks and coastal shoreline cause thousands of dollars in damages. The impact from these events disturbs fish and wildlife habitats by washing nonpoint source pollutants such as fertilizers, pesticides, nitrogen, and phosphorus, along with sediments, into the Patuxent River and eventually into Chesapeake Bay.

Riparian buffer restoration, shoreline stabilization, and the other best management practices (BMPs) are a common sense way for landowners to protect their land and to show commitment to protecting water quality in the Patuxent River.

This booklet will help landowners understand how buffers, shoreline stabilization, and structural and nonstructural BMPs help reduce nonpoint source pollutants and how they can install these practices on their property. Since many of these practices are expensive to implement, federal and state agencies offer cost-sharing programs or low interest loans to landowners.

Properly installed and maintained, buffers and BMPs add beauty and diversity to your farm or property. They also increase land value and show commitment to protecting the Patuxent River Watershed.

Definition of a Riparian Buffer:

A riparian buffer is an area of trees, shrubs, grasses/ forbs and legumes, found next to rivers, streams, ponds, lakes, and wetlands.

Roles of a Riparian Buffer:

Riparian buffers, combined with other BMPs or shoreline stabilization, are designed to trap sediments and slow surface runoff and subsurface and deeper groundwater that flows from upland sources. Riparian buffers filter out and trap phosphorus, nitrogen, pesticides, fertilizers, and heavy metals before they enter surface waters or groundwater recharge areas. Buffers help reduce blowing soil in strong winds. They protect and shelter livestock in bad weather and provide protection for wildlife. They keep stream temperatures cooler, improving fish habitats. Wooded buffers can also be selectively harvested as an extra source of income.

Buffers are most effective when combined with other BMPs. For example, streambanks or shorelines must be stabilized using streambank or shoreline protection before the establishment of the buffer. To maintain the riparian buffers, excessive water flows and erosion have to be controlled upslope using filter strips, stripcropping systems, no-till farm operations, diversions, critical area plantings, or other best management practices.

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TYPES OF SHORELINE EROSION PROTECTION

Nonstructural Stabilization

No Action or Relocation: If a property has a very low erosion rate or only erodes during major storms, the estimated property loss may be less than the cost of stabilization. If the encroachment of water on the property threatens valuable structures, then relocation of the structures should be the next alternative considered.

Advantages:

- *Saves money and avoids accelerating erosion on adjacent properties.*
- *A more natural shoreline for wildlife and aquatic life.*

Disadvantages:

- *Waterfront property may be costly and there would be no protection from erosion.*
- *Relocation takes special equipment and expertise and could be costly.*
- *The introduction of sediment into the water from uncontrolled erosion can be harmful to fish and aquatic plants.*

Slope Grading: The banks of the shoreline may be unstable because of the steepness of the slope. Grading will reduce the steepness of the slope.

Advantages:

- *Slows erosion caused by waves undercutting a steep slope.*
- *Reduces the sediment in the water.*
- *Provides an area for vegetation to grow, providing food and habitat to wildlife.*

Disadvantages:

- *These two practices alone are not usually effective against intensive wave action.*
- *Slope grading and terracing cannot be done where bulkheads or revetments are in proximity to the property.*

Slope Grading



Beach Nourishment: The replacement of sand on an eroding beach.

Advantages:

- *Provides effective protection without altering the recreational value.*
- *Maintains the natural integrity of a shoreline.*

Disadvantages:

- *Addition of sand might result in shoaling of adjacent waterways.*
- *Increases turbidity during placement, causing temporary damage to fish and aquatic habitats.*
- *Where no beach exists, or where there is rapid sand removal, maintaining a beach might be impractical or difficult.*



Beach Nourishment
(photo courtesy Rosalie
and M. Kiplinger Hine)

Marsh Creation: Tidal marshes form the transition zone from open water to the upland area. Tidal marshes are an important link in the food chain of Patuxent River and its tributaries.

Advantages:

- *Marshes serve as a buffer filtering out sediments and nutrients entering tidal waters from upland runoff.*
- *Marshes provide food and habitat for thousands of species of plants and animals.*
- *Marshes provide natural shoreline erosion control that helps bind the soil against erosion and helps extend the life of other erosion control structures.*
- *Marshes improve water quality by filtering out excessive nutrients.*
- *Marshes maintain the natural shoreline process.*

Disadvantages:

- *Marsh creation can only be used along shorelines with low erosion rates.*



Marsh Creation
(photo courtesy Rosalie and M.
Kiplinger Hine)

Selecting nonstructural shore erosion control methods such as the ones mentioned above provide greater environmental benefits than structural control methods. In particular, marsh creation projects not only reduce erosion but also enhance the fisheries value of the area and reduce pollutants entering the bay.

Structural Shoreline Stabilization

Revetments: Stone or concrete rubble, covering the shore at a sloping angle. Wave energy dissipates over the armor stone, reducing erosion.

Advantages:

- *Revetments do not redirect wave energy to unprotected areas because they reduce the wave energy as it washes up the rock slope.*
- *Revetments are porous, allowing the water to filter through after the wave energy has been slowed.*

Revetments



-
- *Stone structures do not degrade over time.*
 - *The stone provides habitat for aquatic organisms.*
 - *There are no preservatives in revetments like those found in the treated wood in bulkheads.*

Disadvantages:

- *Large amounts of stone are needed; buying and transporting it is very costly.*
- *Limited access to the shoreline makes transport of materials difficult. The Revetment itself also limits access to the water for recreation or other uses.*

Sill and Breakwater: Similar to a revetment except that sills are low in the water to allow water to flow in and out behind the structure. Also, typically located 25-35 feet channelward of mean high water.

Advantages:

- *At high tide the sill provides access for aquatic life to move to and from wetlands behind it.*
- *The rocks are porous, allowing water to filter through after the wave energy has been slowed down.*
- *Provides habitat for aquatic life.*

Disadvantages:

- *Similar to revetments-- costly and limited access to the shoreline.*



Sill and Breakwater

Offshore Breakwater: An offshore structure designed to reduce wave energy before it reaches the shore.

Advantages:

- *Offshore breakwaters allow drift material to be deposited behind the breakwater uninterrupted. This buildup of material protects the shore and may extend the beach.*
- *An offshore breakwater creates a low energy zone between it and the shore, providing protection to the beach and vegetation.*

Disadvantages:

- *The cost is prohibitive to most landowners.*
- *Due to the complex nature of the design, a professional engineer should be consulted.*

Offshore Breakwater



Gabions: Square or rectangular wire baskets filled with stone.

Advantages:

- *They are very versatile and can be used as revetments, groins, bulkhead-type walls, or as an offshore breakwater.*
- *Can be constructed without heavy equipment.*

Disadvantages:

- *The wire baskets may open in heavy waves, releasing stones.*
- *Debris can damage the baskets.*

Gabions

Groins: Narrow, finger-like structures that extend perpendicular to the shore. They interrupt longshore transport, allowing deposition of sand. They can be made of wood, steel, stone, or concrete well caps.

Advantages:

- *The accumulation of sand between the groins acts as a barrier that waves can attack and erode without damage to the upland areas.*
- *Groins provide beach stabilization.*

Disadvantages:

- *Sand moving along a shoreline is interrupted, resulting in sand starvation on adjacent properties.*
- *Placement of a groin does not necessarily guarantee the accumulation of sand.*



Groins at Jefferson
Patterson Museum

Bulkheads: Vertical walls built parallel to the shoreline to hold back the sea and to “shore up” the land behind it to prevent erosion.

Bulkhead with revetment



Advantages:

- *Bulkheads protect the shoreline in severe conditions.*

Disadvantages:

- *They prevent the natural landward migration of marshes, wetlands, and sand.*
- *Steel bulkheads corrode over time; wooden bulkheads rot. Both eventually fail.*
- *Bulkheads eventually cause erosion to adjacent properties by transferring wave energy.*
- *Least desirable type of shoreline protection from a permitting standpoint.*

PERMIT REQUIREMENTS

Federal and state governments generally require that a permit be obtained prior to the construction of any shoreline erosion control project. **Fines can be imposed if work is begun before permits are obtained.** Landowners should contact Maryland Department of the Environment and the U. S. Army Corps of Engineers if there is any question a permit is needed. Local (county or municipal) governments should be contacted because permit requirements vary.

Federal Permits

Federal permits for shore erosion control measures are issued by the U. S. Army Corps of Engineers. The Corps has responsibility for the administration of federal laws for protection and preservation of the waters of the United States.

The U. S. Army Corps of Engineers circulates permit applications for comment to the Environmental Protection Agency, the U. S. Fish and Wildlife Service, the National Marine Fisheries Service, and appropriate state and local agencies. Federal permits will be issued in conjunction with State Water Quality Certifications and State Coastal Zone Consistency determinations that have been provided to the Corps.

State Permits

Shoreline protection projects usually involve construction at or channelward of the mean high water line. Waterfront property owners must apply to the Maryland Department of the Environment for a permit or license to alter wetlands.

Permit approvals are based on an evaluation of the impact of the proposed project on varying ecological, economic, developmental, and aesthetic values. The law recognizes the right of waterfront property owners to control erosion on their land, to gain access to navigable waters from their land, and to reclaim land lost to erosion.

How To Apply For Federal Or State Permits

Only one application is necessary for a license, permit or approval from both the federal and state governments. This single application should be submitted to the Maryland Department of the Environment, Water Management Administration:

MDE - WMA
Regulatory Services Coordination Office
Tawes State Office Building D-2
Annapolis, MD 21401
1-800-876-0200

The MDE Permit Service Center distributes copies of the joint application to all federal and state wetland regulatory agencies for review and comment.

In addition to federal and state wetlands permits, a sediment and erosion control plan approved by a local Soil Conservation District (Montgomery County - Department of Permitting Services 1-301-217-6300) may be required before any work begins. Landowners should consult their local Soil Conservation District for technical advice on how to address sediment control during construction of erosion control projects.

Projects must also be in compliance with the Chesapeake Bay Critical Area Protection Program. Under that program's requirements, first preference is given to nonstructural shore erosion control measures. For more information on these requirements, landowners should contact their local Soil Conservation District or city or county planning and zoning office.

TYPES OF BUFFERS AND BEST MANAGEMENT PRACTICES

Stream Buffer: A naturally vegetated buffer between upland disturbance (development and cropland) and stream channels. Types of buffers: forested, grass, or a combination of both.

Benefits:

- *A buffer acts as a filter for the removal or reduction of sediment, nutrients, and toxic substances that enter nearby waterways.*
- *A buffer minimizes the adverse impact of human activities on wildlife habitats in critical areas.*
- *A buffer helps protect water quality and plant, fish, and wildlife habitats.*



Stream buffer next to
the Patuxent River at
Jug Bay Farm

Filter Strips: Strips of grass, trees, or shrubs used to trap sediment, pesticides, and other pollutants between a crop field and stream channel. Filter strips are usually located at the lower edges of fields.

Benefits:

- *Filter Strips provide food and cover for small birds and animals.*
- *Ground cover reduces soil erosion.*
- *Vegetation protects water quality by preventing pesticides and other pollutants from entering waterways.*

Windbreaks: A row of trees, shrubs, or other vegetation planted to reduce wind erosion.

Benefits:

- *Windbreaks reduce or prevent soil erosion from strong winds.*
- *Windbreaks provide cover and food for wildlife.*
- *They use or store extra nutrients from nearby runoff.*
- *Windbreaks act like a snow fence.*

Stream Crossing: Controlled access for livestock and/or equipment to cross a stream.

Benefits:

- *Stream Crossings improve water quality by keeping nutrients and sediments out of streams.*
- *Stream Crossings allow heavy equipment to cross easily.*
- *Trees, shrubs, and vegetation planted around the stream provide shade, keeping water temperatures cooler for aquatic life, and provide food and habitat for wildlife.*
- *Stream Crossings add beauty and value to the land.*

Contour Buffer Strip: Strips of perennial vegetation alternated with wider cropland strips that are farmed on the contour.

Benefits:

- *Contour Buffer Strips reduce soil erosion.*
- *Contour Buffer Strips minimize sediment and other pollutants reaching streams or ponds.*
- *Contour Buffer Strips provide habitat and food for wildlife.*

Field Borders: Grass-seeded areas at the end or edges of cropland that work like filter strips.

Benefits:

- *Vegetative cover reduces erosion by slowing water runoff.*
- *Vegetation filters the runoff to improve water quality.*
- *Grass strips are available for harvesting hay or just for mowing.*
- *Field Borders provide easy field access and can be used for a farm equipment turnaround, eliminating end rows that run up and down slope that can cause erosion.*
- *Provides wildlife habitat if managed properly.*

Field border and grass
waterway combination



Grassed Waterway: A natural or manmade channel that is planted in grass to control gully erosion caused by concentrated water runoff from surrounding crop fields.

Benefits:

- *Grassed Waterways divert water runoff to a protected channel.*
- *Grassed Waterways prevent or reduce soil erosion along the waterway.*
- *They filter or trap plant nutrients or crop chemicals from adjacent cropland and improve water quality downstream.*
- *Grassed Waterways prevent the development of gullies from runoff.*



Grassed Waterway

Grass Diversion: A channel cut across a slope with a supporting ridge or terrace on the lower side. They are used to collect water and direct it away from active gullies or critically eroding areas.

Benefits:

- *Grass Diversions trap fertilizer and pesticides before they are washed away to pollute waterways.*
- *Grass Diversions cover and protect soil from rain runoff.*
- *They direct water away from active gullies or critically eroding areas.*



Grass Diversion

Alley Cropping: An agroforestry practice where crops are planted between rows of larger, mature trees.

Benefits:

- *Alley Cropping provides a windbreak that controls blowing sediments.*
- *Mature trees can be harvested, adding income to the farm.*
- *They filter out extra nutrients from runoff and ground water.*
- *Alley Cropping provides food and habitat for birds and other wildlife.*

Stripcropping: Crop rotation and tillage combined in even-width strips of row crops (corn or soybeans) and small grains or hay established either across the general slope of a field or on a true contour.

Benefits:

- *Field Stripcropping helps reduce soil erosion and protects water quality.*
- *It may help reduce fertilizer costs.*
- *It encourages crop rotation that breaks up like chemical groups for better weed control and better utilizes nitrogen and phosphate uptake.*

Field Stripcropping



Cross-Slope Farming: Tillage, planting, and cultivating is done close to the contour across the slope of the land, which slows runoff.

Benefits:

- *Cross-Slope Farming reduces or prevents soil erosion by slowing the runoff.*
- *Strips help retain water, sediment, nutrients, fertilizers, and pesticides to help improve water quality downstream.*



Contour Strips

Conservation Tillage: No-till or Conservation Tillage is when most of the crop residue is left on the surface of the field after harvesting. The soil is left undisturbed before planting. At the time of planting, disturbance is limited to opening a slot and placing seed.

Benefits:

- *No-till eliminates or reduces the need for tillage implements such as disks, plows, and other types of harrows.*
- *No-till allows farmers to plant more acres of crops in a shorter period of time with fewer trips across the field..*
- *Soil disturbance is limited, reducing erosion.*



Conservation Tillage
(no-till corn)

Planned Grazing System: Two or more pastures or paddocks with fencing, where livestock is rotated based on forage availability. A planned grazing system provides for **fencing animals out of streams.**

Benefits:

- *A planned grazing system increases harvest efficiency, quality of production, and adequate forage.*
- *It evenly distributes manure nutrients.*
- *It improves vegetative cover, reducing erosion and improving water quality.*

Pasture and Hayland Management: The proper management and treatment of pasture and hay stands for maximum forage production.

Benefits:

- *Pasture and hayland management prolongs the life of desirable forage species.*
- *It improves forage quality.*
- *It protects soil from erosion.*
- *Pasture and hayland management reduces water loss and improves water quality.*

Crop Residue Management: Leaving last year's crop residue on the surface before and during planting operations provides ground cover.

Benefits:

- *Ground cover protects soil from erosion and improves water quality.*
- *Decomposition adds organic matter to soil.*
- *Fewer trips over the fields with farm equipment and less tillage reduces soil compaction.*
- *It provides savings in labor, time, and energy.*

Cover Crops: Small grain crops such as cereal rye, oats, and winter wheat are planted in early fall to help protect fields from erosion.

Benefits:

- *Cover crops uptake any residual nutrients left in soil profile from previous crops and binds the nutrients into the plant's biomass for later use rather than leaching through the soil or running off, improving water quality.*
- *Cover crops protect soil from wind and runoff.*
- *Cover crops reduce weed competition.*

Crop Rotation: Crops are changed year by year in a planned sequence.

Benefits:

- *Naturally breaking the cycles of weeds, diseases, and insects helps reduce pesticide costs.*
- *Crop rotation improves water quality by preventing excess nutrients or chemicals.*

Terrace: An earthen embankment around a hillside that stops water flow and stores it or guides it off a field. It follows the contour, breaking long slopes into smaller ones.

Benefits:

- *A terrace slows and controls runoff, preventing erosion.*
- *It improves soil and water quality.*
- *It provides nesting habitat.*

Nutrient Management: Controlling the placement, amount, and timing of plant nutrient applications that are associated with commercial fertilizers, organic wastes, and crop residues.

Benefits:

- *Nutrient management allows for optimum crop yields.*
- *It minimizes the entry of nutrients to surface and ground water.*
- *It maintains or improves the chemical and biological condition of the soil.*

Animal Waste Storage Structure: Stores liquid, slurry, or solid manure until conditions are right for field application.

Benefits:

- *An animal waste storage structure reduces fertilizer costs and nutrient losses.*
- *It allows for field application when conditions are right.*
- *It prevents runoff from feedlots, protecting water quality.*



Construction of
Animal Waste
Storage Structure

Roof Runoff Management: Collecting, controlling, and disposing of runoff from barn roofs.

Benefits:

- *Roof runoff management keeps water from flowing across concentrated waste areas, barnyards, roads, and alleys.*
- *It reduces erosion and pollution, prevents flooding, and improves drainage.*

Grade Stabilization Structure: An earth, wood, or cement structure across a drainage area that controls gully erosion.

Benefits:

- *A grade stabilization structure serves as a trap for plant nutrients and pesticides.*
- *It provides streambank protection.*

Grade Stabilization
using a Hickenbottom
device



- *It reduces the amount of sediment entering streams by controlling gully erosion.*
- *A grade stabilization structure may be constructed to provide water storage.*

Rock-Lined Channel: Controls heavy water flows in highly erodible soils or on steep slopes.

Benefits:

- *A rock-lined channel protects against soil erosion in steep areas and in heavy water runoff.*
- *It slows the water flow in the surrounding drainage area.*
- *It traps sediment and chemical pollutants before they reach streams or rivers.*
- *It stands up to heavy use by animals and people.*

Rock-lined channel to control pipe outflow



Sediment Control Ponds: Built to trap sediment from sheet erosion over large drainage areas



Sediment Control Pond

Benefits:

- *A pond supplies water for irrigation.*
- *It can reduce water velocity and volume.*
- *It collects sediment and other pollutants from surrounding areas.*
- *A pond can supply water for livestock.*
- *It provides habitats for aquatic life and game animals.*
- *It provides ground water recharge.*

Spring Development: A trough or tank installed to provide livestock with water from a spring, pond, or well. It includes exclusion fence.

Benefits:

- *Spring development helps reduce erosion by keeping livestock from stream beds, ponds, or wetlands.*
- *It reduces the amount of nutrients entering streams and improves water quality.*

Many other Best Management Practices exist, but these are the most commonly used in the Patuxent River Watershed.

Spring Development.

This trough has a solar-powered pump.



CONSERVATION PROGRAMS

Cost-share funding is now available from a variety of sources to help landowners install certain highly valued best management practices (BMPs). By combining sources, farmers may receive up to 100 percent of the eligible cost to install certain practices under certain programs.

Conservation Reserve Program (CRP): This is a federal program that encourages farmers to convert highly erodible cropland or other environmentally sensitive acreage to vegetative cover to control erosion and improve water quality and wildlife habitat. There is an annual land rental payment to the farmer and up to 50 percent cost-share to establish the practice.

- **Types of projects:** *Include filter strips, riparian buffers, field windbreaks, grassed waterways, salt-tolerant vegetation, and shallow water areas for wildlife.*
- **Eligibility:** *Cropland that has been planted during two of the last five years. The program offers up to 50 percent cost-share for establishment and an annual rental payment (with a 20 percent bonus for planting trees) for 10 to 15 years while the practice is being maintained.*
- **Contact:** *Local Soil Conservation District/USDA-NRCS office.*

Maryland's Conservation Reserve Enhancement Program (CREP): This is a Maryland-specific enhancement of USDA's CRP program. Farmers take riparian lands, certain highly erodible lands, or wetlands out of production for up to 15 years, while implementing a range of BMPs. These help in reducing soil erosion and sedimentation in streams and lakes, improves water quality, establishes wildlife habitat, and enhances forest and wetland resources. Farmers receive an annual rental payment for the term of the multi-year contract.

- **Types of Projects:** *Filter strips, riparian buffers, wetland restoration, and highly erodible land within 1,000 feet of a stream or body of water.*

Environmental Quality Incentive Program (EQIP): This is a federal cost-share program that provides assistance to farmers to conserve soil and improve air and water quality and related natural resources.

- **Types of Projects:** *Structural practices may vary but include establishment of fencing, filterstrips, agricultural waste systems, diversions, riparian forest buffers, and streambank stabilization. It also includes stream crossings, along with other stream corridor conservation management practices such as no-till, residue, and pest management.*
- **Eligibility:** *Those landowners engaged in livestock or agricultural production. EQIP provides technical assistance, cost-share payments, incentive payments, and education to producers who enter into 5 to 10 year contracts based on conservation plans.*
- **Contact:** *Local Soil Conservation District/USDA-NRCS office.*

Maryland Agricultural Water Quality Cost-Share Program (MACS): This is a state program to help farmers cover up to 87.5 percent of the cost to install eligible BMPs (65 percent for ponds) to control soil erosion, manage nutrients, and protect water quality.

- *Types of Projects:* Riparian Forest and Herbaceous cover buffers, agricultural waste structures, filterstrips, waterways, stream fence, and watering troughs.
- *Eligibility:* Agricultural lands with soil erosion and/or water quality issues.
- *Contact:* Local Soil Conservation District/USDA-NRCS office.

Linked Deposit Program (LDP): This is a low interest loan program available to farmers to help address nonpoint source pollution. These low interest loans can be used to cover the installation of certain BMPs when participating with MACS, or to cover the full cost of a BMP if installed without public financial assistance.

- *Eligibility:* Structural BMPs such as manure storage, stream fencing, and wetland creation are eligible.
- *Contact:* Local Soil Conservation District/USDA-NRCS office.

Buffer Incentive Program (BIP): This is a state grant program to encourage the planting and maintenance of forest buffers on private land.

- *Types of Projects:* Tree planting and maintenance along streams and shorelines.
- *Eligibility:* Private lands along shorelines and streambanks. A one-time \$300 per acre grant to landowners to plant and maintain forest buffers for a minimum of 10 years.
- *The project must be:*
 - 5 acres or more in size and no more than 50 acres;
 - a minimum of 50 feet in width which may include existing forest;
 - a maximum 300 feet wide;
 - adjacent to and within 300 feet of a stream, river, pond, wetland, or open water.
- *Contact:* Maryland DNR, Maryland Forest Service, or the local Soil Conservation District/USDA-NRCS office.

Forestry Incentives Program (FIP): This is a federal program that provides private, non-industrial forest landowners financial assistance for carrying out forestry practices that will increase future supplies of wood and fiber.

- *Types of Projects:* Planting trees, improving a stand of forest trees, and site preparation for natural regeneration.
- *Contact:* Local Soil Conservation District/USDA-NRCS office.

Stewardship Incentive Program (SIP): This is a federal cost-share program to increase enhanced management on non-industrial private forest lands.

- **Types of Projects:** *Management plan development, tree planting, forest and agroforest improvement, fisheries and wildlife habitat improvement, windbreak and hedgerow establishment, soil and water improvement, and forest recreation enhancement.*
- **Eligibility:** *Private forest with existing tree cover or other rural lands suitable for conversion to program practices. To be eligible for cost-sharing (up to 65 percent for SIP) the landowner must:*
 - *have at least one and no more than 1,000 acres of nonindustrial private forest;*
 - *have a Forest Stewardship Plan for all contiguous forest acreage;*
 - *agree to maintain the SIP practice for at least 10 years.*
- **Contact:** *Maryland Department of Natural Resource or the local Soil Conservation District/USDA-NRCS office.*

Wildlife Habitat Incentive Program (WHIP): This is a federal cost-share program to improve or increase wildlife habitat and enhance other environmental benefits.

- **Types of Projects:** *Establishment of conservation cover. Riparian buffer habitat can include fencing, critical area stabilization, forest buffers, filter strips, and associated practices that will benefit wildlife.*
- **Eligibility:** *Private lands including land owned by non-government organizations (not required to be a agricultural producer). The program offers up to 75 percent cost-share for all eligible practices. The program requires a 5 to 10 year contract. Establishment of riparian buffer habitat and grassland/early successional habitat are priorities. Ducks Unlimited and Chesapeake Bay Foundation also provide cost-share for riparian and shallow water practices to make a total of 100 percent.*
- **Contact:** *Local Soil Conservation District/USDA-NRCS office or Maryland DNR, Wildlife Division.*

Partners for Wildlife (PFW): A federal program to restore wildlife habitat and wetlands.

- **Types of Projects:** *Wetland restoration, wildlife and wetlands habitat, tree planting, and fencing. Provides technical assistance for creating/restoring waterfowl habitat.*
- **Eligibility:** *Any degraded or converted wetland, some riparian areas for tree planting and wildlife enhancement, with a minimum 10 year agreement. Limited cost-share available.*
- **Contact:** *U. S. Fish and Wildlife Service or the local Soil Conservation District/ USDA-NRCS office.*

Farmland Protection Program (FPP): Provides funds to help purchase development rights to keep productive farmland in agricultural use. Working through existing programs, USDA joins with state, tribal, or local governments to acquire conservation easements or other interests from landowners.

- **Eligibility:** *Farmland must be part of a pending offer from state, tribe, or local farmland protection program, be privately owned, have a conservation plan, be large enough to sustain agricultural production, be accessible to markets for what the land produces, have adequate agricultural support services, and have surrounding parcels of land that can support long-term agricultural production.*
- **Contact:** *Local Soil Conservation District/USDA-NRCS office, state, or county Agriculture Land Preservation Program.*

Wetlands Reserve Program (WRP): This is a voluntary federal cost-share program to restore wetlands. Participating landowners can establish conservation easements of either permanent or 30 year duration, or can enter into restoration cost-share agreements where no easement is involved. In exchange for establishing a permanent easement, the landowner receives payment up to the agricultural value of the land.

- **Contact:** *Local Soil Conservation District/USDA-NRCS office.*

ABBREVIATIONS USED IN THIS GUIDE

ACB	Alliance for the Chesapeake Bay
ACOE	Army Corps of Engineers
BIP	Buffer Incentive Program
BMPs	Best Management Practices
CBCAC	Chesapeake Bay Critical Area Commission
CBF	Chesapeake Bay Foundation
CBP	Chesapeake Bay Program
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
DNR	Maryland Department of Natural Resources
DU	Ducks Unlimited
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentive Program
FIP	Forestry Incentive Program
FPP	Farmland Protection Program
FSA	Farm Services Administration
LDP	Linked Deposit Program
MACS	Maryland Agricultural Water Quality Cost-Share Program
MDA	Maryland Department of Agriculture
MDE	Maryland Department of the Environment
MDNR	Maryland Department of Natural Resources
NRCS	Natural Resources Conservation Service
PFW	Partners For Wildlife
RFBs	Riparian Forest Buffers
SEC	Shoreline Erosion Control Program
SIP	Stewardship Incentive Program
SCD	Soil Conservation District
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
WHIP	Wildlife Habitat Incentive Program
WMA	Water Management Administration
WRP	Wetland Reserve Program

GUIDE TO CITIZEN RESOURCES

Contact the local Soil Conservation District or United States Department of Agriculture (USDA) Service Center.

Soil Conservation Districts

Allegheny	(301) 777-1747
Anne Arundel	(410) 222-7822
Baltimore County	(410) 666-1188
Calvert	(410) 535-1521
Caroline	(410) 479-1202
Carroll	(410) 848-8200
Catoctin	(301) 695-2803
Cecil	(410) 398-4411
Charles	(301) 934-9588
Dorchester	(410) 228-3733
Frederick	(301) 695-2803
Garrett	(301) 334-6950
Harford	(410) 838-6181
Howard	(410) 465-3180
Kent	(410) 778-5150
Montgomery	(301) 590-2855
Prince George's	(301) 574-5162
Queen Anne's	(410) 758-3136
St. Mary's	(301) 475-8402
Somerset	(410) 651-0390
Talbot	(410) 822-1344
Washington	(301) 797-6821
Wicomico	(410) 546-4731
Worcester	(410) 632-5439

USDA Service Centers

Allegheny	(301) 777-1536
Anne Arundel	(410) 574-5152
Baltimore County	(410) 666-1188
Calvert	(410) 535-1521
Caroline	(410) 479-1202
Carroll	(410) 848-2780
Cecil	(410) 398-4411
Charles	(301) 934-1218
Dorchester	(410) 228-5640
Frederick	(301) 662-1321
Garrett	(301) 334-6954
Harford	(410) 838-3950
Howard	(410) 465-3180
Kent	(410) 778-5353
Montgomery	(410) 590-2846
Prince George's	(301) 574-5162
Queen Anne's	(410) 758-1380
St. Mary's	(301) 475-8431
Somerset	(410) 651-0370
Talbot	(410) 822-1344
Washington	(301) 797-0500
Wicomico	(410) 546-4777
Worcester	(410) 632-2464

GUIDE TO CITIZEN RESOURCES (Cont.)

The Chesapeake Bay Program

410 Severn Avenue, Suite 109
Annapolis, MD 21403
(410) 267-5700
1-800-YOUR-BAY

Chesapeake Bay Trust

60 West Street
Annapolis, MD 21401
(410) 974-2941

Chesapeake Bay Critical Area Commission

45 Calvert Street
Annapolis, MD 21401
(410) 260-7516

Maryland Department of Agriculture

Office of Resource Conservation
Conservation Grants Program
50 Harry S Truman Parkway
Annapolis, MD 21401-7080

Maryland Department of Natural Resources Forest Service

Tawes State Office Building, E-1
Annapolis, MD 21401
(410) 260-8531

REGIONAL OFFICES

Western Region

Bob Webster, Regional Forester
(301) 777-2137
(301) 777-2197 FAX

Southern Region

Kenneth Jolly, Regional Forester
(301) 464-3065
(301) 464-0462 FAX

Eastern Region

Kip Powers, Regional Forester
(410) 543-6745
(410) 543-6768 FAX

Central Region

Jeff Horan, Regional Forester
(410) 836-4551
(410) 836-4552 FAX

COUNTY OFFICES

Anne Arundel County

Bud Reaves, Forester
(410) 768-0830
(410) 768-7134 FAX

Calvert County

Steve Stadelman, Project Manager
(410) 535-1303
(410) 535-4737 FAX

Charles County

David Gailey, Project Manager
(301) 934-2543
(301) 934-8685 FAX

Howard/ Montgomery County

David Plummer, Project Manager
Mark Beales, Forester
(410) 854-6060

Prince George's County

Bill Brumbley
(301) 464-3065
(301) 464-0462 FAX

St. Mary's County

(301) 475-8551
(301) 475-4036 FAX

State Forest Tree Nursery
MD Department of Natural Resources
3424 Gallagher Road
Preston, MD 21655
1-800-TREESMD
1-800-873-3763

Forestry, Heritage & Wildlife Program
580 Taylor Ave, E-1
Annapolis, MD 21401

U. S. Army Corps of Engineers
Baltimore District - Permit Section
P.O. 1715
Baltimore, MD 21203
(410) 962-4500

U. S. Fish and Wildlife Service
177 Admiral Cochrane Drive
Annapolis, MD 21401
(410) 573-4500

Maryland Department of the Environment
Water Resources Administration
Permit Service Center
Tawes State Office Building, D-2
Annapolis, MD 21401
(410) 974-2755

Maryland Department of the Environment
Tidal and Nontidal Permit Division
Water Resources Administration
Tawes State Office Building, D-4
Annapolis, MD 21401
(410) 974-3871

Department of Natural Resources
Shore Erosion Program
Tawes State Office Bldg., D-4
Annapolis, MD 21401
(410) 260-8531

DEMONSTRATION PROJECTS

Below are Nonstructural Shoreline Erosion Control Program projects on state-owned lands around the bay for public education.

- Chapel Point State Park (Charles County)
- Jefferson Patterson Museum (Calvert County)
- Horn Point (Dorchester County)
- Janes Island State Park (Somerset County)
- St. Mary's City (St. Mary's County)

FARMERS AND LANDOWNERS TO CONTACT

Listed below are people who will happily share their insight, skill and experiences about the advantages, disadvantages, costs, and maintenance of practices they have installed.

FOREST BUFFER

Ivy Neck Farms
John and Betty Colhoun
205 Mill Swamp Road
Edgewater, MD 21037

Jug Bay Wetlands Sanctuary
Chris Swarth
(410) 741-9330

Jim Clark
(410) 730-8973

Merkle Wildlife Sanctuary and DNR
Downing Farm
Ranger Dan Yankee
(301) 888-1410

MARSH CREATION

Mr. and Mrs. Hine
PO Box 1314
Lusby, MD 20657
(410) 326-6456

Mrs. Mileto
Rt. 1 Box 552 A
Hollywood, MD 20636
(301) 373-2833

Mr. Jay Hanks
45357 Daniels Road
Hollywood, MD 20636
(301) 373-5474
Marsh creation with a low
water sill.

SHALLOW WATER AREA FOR WILDLIFE

Nancy Virts
(301) 884-3770

WETLAND BENCH

Jefferson Patterson Museum
Mike Smolek
(410) 586-8512

STREAM CROSSING

William Carter
(410) 757-7405

Queen Anne Farms
Carl Brady
(301) 249-2427

For products and design for a heavy equipment
stream crossing

STREAM FENCING

Mark Muir Forester
Clark Aist
Maple Spring Farm
(301) 372-6307

Pleasant Valley Farms
Robert Stabler
(301) 774-9290

Ivy Neck Farms
John and Betty Colhoun
205 Mill Swamp Road
Edgewater, MD 21037

Jim Clark
(410) 730-8973

SEDIMENT PONDS

Jefferson Patterson Museum
Mike Smolek
(410) 586-8512

WETLAND RESTORATION

University of Maryland
Robert Kratochvil
(301) 596-9330
Buffers and Tree Tubes

Merkle Wildlife Sanctuary
Ranger Dan Yankee
(301) 888-1410

SPRING DEVELOPMENT

Ivy Neck Farms
John and Betty Colhoun
205 Mill Swamp Road
Edgewater, MD 21037
Solar powered well system

Maple Spring Farm
Clark Aist
(301) 372-6307

Pleasant Valley Farms
Robert Stabler
(301) 774-9290

GRASS WATERWAY

Pleasant Valley Farms
Robert Stabler
(301) 774-9290

COVER CROP

Bald Eagle Farm
Robert Clagett Jr.
(301) 574-5162

TERRACE

Pleasant Valley Farms
Robert Stabler
(301) 774-9290
(See photo) filters out manure wastewater from a storage area.

NO-TILL DRILL

Bald Eagle Farm
Robert Clagett Jr.
(301) 574-5162

GRADE STABILIZATION

Green Holly School
Hollywood Elementary School
Contact St. Mary's Soil Conservation District
(301) 475-8402

CONTOUR STRIPS

Pleasant Valley Farms
Robert Stabler
(301) 774-9290

MANURE STRUCTURE

Pleasant Valley Farms
Robert Stabler
(301) 774-9290

If there are any practices that you need more information on, contact your local Soil Conservation District Office.

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